



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2002ND9B

Title: Evaluation of walleye to suppress fathead minnow populations in Type IV & V wetlands.

Project Type: Research

Focus Categories: Wetlands, Ecology, Water Quality

Keywords: Wetlands, turbidity, walleyes, fathead minnows, zooplankton, algae, waterfowl

Start Date: 05/01/2002

End Date: 12/31/2002

Federal Funds Requested: \$11,312

Non-Federal Matching Funds Requested: \$22,700

Congressional District: At large

Principal Investigator:

Malcolm George Butler

North Dakota State University

Abstract

Changes to the landscape of the prairie pothole region over the last hundred years, primarily due to agriculture, have caused the consolidation of temporary, seasonal, semi-permanent, and permanent wetlands, creating large Type IV and V wetlands. These larger, deeper wetlands are consistently found to be in a turbid state. The increase in the depth of many prairie wetlands due to drainage and consolidation has caused a decrease in the frequency and extent of summer and winter anoxia. Historically such harsh conditions have kept fathead minnow populations in check. Fathead minnows now persist on a more permanent basis, and population densities often become very high, with repercussions throughout the food web. The high densities of fathead minnows reduce zooplankton and macroinvertebrate diversity and abundance. Reductions in zooplankton in turn directly contribute to very high abundances of algae, which are directly associated with increases in turbidity and degraded water quality. The high turbidity causes a reduction in macrophyte diversity and abundance. The overall degradation of wetlands deters waterfowl use, as many waterfowl species are dependent upon zooplankton, macroinvertebrates, and macrophytes as major food sources. The degradation of prairie pothole wetlands as a result of fathead minnow infestations is a steadily increasing problem. Innovative, effective ways to control the distribution and abundance of fathead minnow populations in wetlands throughout the Prairie Pothole Region are needed by wetland managers. The purpose of this project is to assess one possible tool that could be used by wetland managers to improve conditions in degraded wetlands. The project also focuses on the effectiveness of wetlands as rearing sites for walleyes for subsequent stocking in lakes. Wetlands are already used for walleye rearing, but the net effects the walleyes may have on the wetlands themselves are not clear.

The expected effect of adding walleyes to type V and IV wetlands with fathead minnows is that of a "trophic cascade". The walleyes should decrease densities of fathead minnows. The decrease in fathead minnows should allow zooplankton and invertebrate diversity and densities to increase. The increase in zooplankton, particularly *Daphnia*, should cause a decrease in alga standing stock, which will increase water clarity (or decrease in turbidity). The decrease in turbidity should allow macrophytes to increase in diversity and abundance. The decrease in turbidity and increases in zooplankton and macrophytes should

also increase use of the wetlands by waterfowl. The survival and growth rates of the walleyes are expected to high.